



contributors of messages on that topic that a new discussion forum be created. If any of the contributors agrees to the suggestion, a new discussion forum is created by the agent. The agent and the contributors are then automatically subscribed to the new forum, and an invitation to join the new forum can be optionally delivered to all or a portion of the full membership of the original forum, plus any other recipients of postings on the topic.

Aspects of the present invention relate to an information stream monitoring system comprising an information monitoring device that monitors one or more electronic documents in an information stream. The information monitoring device also compares information about the one or more electronic documents to at least one rule. A forum spawning device queries a set of users when at least one of the at least one rules is satisfied, and creates a forum based on one or more replies from the set of users.

Aspects of the present invention also relate to an information stream monitoring method comprising monitoring one or more electronic documents in an information stream. Next, information about the one or more electronic documents is compared to at least one rule. A set of users is then queried when at least one of the at least one rules is satisfied and a new forum created based on one or more replies from the set of users.

Aspects of the present invention also relate to information that monitors one or more electronic documents in an information stream. Including, information that compares information about the one or more electronic documents to at least one rule, information that queries a set of users when at least one of the at least one rules is satisfied; and information that creates a new forum based on replies from the set of users.

Aspects of the present invention also relate to an information monitoring system comprising an information monitoring device for monitoring data associated with electronic documents. The information monitoring device is adapted to compare the data from the electronic documents according to a rule. A forum spawning device queries a set of users when the rule is satisfied, and creates a forum based on a reply from the set of users.

The exemplary forum monitoring system and method of this invention uses a combination of rules and tracking to monitor discussions within a forum, and then subsequently suggest and establish a new forum based on demand.

Specifically, the exemplary system and method of this invention monitor one or more information streams until satisfaction of one or more rules is obtained. Upon satisfaction of one or more rules, the system and method notify a predetermined group of recipients that a rule has been satisfied and requests authorization from the predetermined group of recipients to create a new forum. Upon an indication from one or more of the predetermined group of recipients that a new forum is desired, the systems and methods of this invention establish a new forum and optionally notify the participating users that the new forum as been established.

Additionally, the systems and methods of this invention can be used in conjunction with co-pending Attorney Docket Nos. 1508.003170 entitled "Systems and Methods For Performing Sender-Independent Managing of Electronic Documents" and 1508.003180 entitled "Systems and Methods for the Discovery and Presentation of Electronic Messages that are Related to an Electronic Message," filed herewith and incorporated herein by reference in their entirety.

These and other features and advantages of this invention are described in or are apparent from the following detailed description of the embodiments of the present invention.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

The embodiments of the invention will be described in detail, with reference to the following figures wherein:

FIG. 1 is a functional block diagram illustrating the exemplary forum monitoring device according to this invention; and

FIG. 2 is a flowchart outlining an exemplary method for monitoring an information stream according to this invention.

### **DETAILED DESCRIPTION OF THE INVENTION**

By monitoring traffic in an information stream, the systems and methods of this invention can determine when traffic on a particular topic has reached a threshold. Upon meeting the threshold criteria, the systems and methods of this invention propose to the contributors of that topic, for example, through a user interface, that a new discussion forum be created. Upon confirmation that one or more of the contributors desires a new discussion forum, the systems and methods of this

invention create the new discussion forum and automatically subscribe the list of contributors to the new discussion forum.

In particular, the systems and methods of this invention perform a number of functions for monitoring and managing an information stream. Thus, for example, the systems and methods of this invention identify when a new forum might be of value. Specifically, an agent subscribes to one or more discussion fora, or information streams, as a member in order to receive the information within that forum. The agent monitors the traffic in that forum in order to determine opportunities for creating a new discussion fora. Upon satisfaction of one or more criteria, or rules, a suggestion for a new forum is sent to the users participating in the identified information stream. Specifically, the agent automatically generates a name for the new forum, based on, for example, the subject matter of the information exchanged on the topic triggering the suggesting of a new forum, and then sends a suggestion message to all users who participated in the discussion on that particular identified topic querying whether they would like to create a new discussion forum for that topic.

If any one or more of the topic contributors agrees that a new discussion forum should be created for that topic, a new forum is created. Once the forum has been created, topic contributors can be automatically added as forum members to the new forum. Furthermore, the other members of the parent, or original, discussion forum can optionally be invited to also participate and/or join the new forum. Since some of the members of the newly created forum may not wish to immediately participate fully in the new forum, the discussion and transactions within the new forum can be automatically archived so that non-members may periodically review discussions within the new, or child, forum.

If an invited user, or any other user, decides to join the new forum, the user has the option of receiving a digest containing all or a portion of the messages posted to the new forum. Furthermore, periodic reports can also be sent to the parent forum to provide status information linked to the activity on the child fora that have been spawned from the parent discussion forum. The report generation can be determined and sent, for example, at regular intervals, or when, for example, traffic on the child forum is high, or the like.

FIG. 1 illustrates an exemplary embodiment of a forum monitoring device 100 according to an exemplary embodiment of the present invention. The forum monitoring device 100 comprises an I/O interface 110, memory 120, a controller 130,

an information monitoring device 140, an electronic document storage device 150, a forum spawning device 160, a subscriber determining device 170, an invitation determining device 180 and a subscriber maintenance device 190, all interconnected by link 5. The forum monitoring device 100 is connected to at least one distributed network 200 which is connected to one or more information streams and/or other distributed networks.

While the exemplary embodiment illustrated in FIG. 1 shows the forum monitoring device and associated components collocated, it is to be appreciated that the various components of the forum monitoring device 100 can be located at distant portions of a distributed network, such as a local area network, a wide area network, an intranet and/or the internet, or within a dedicated forum monitoring system. Thus, it should be appreciated that the components of the forum monitoring device 100 can be combined into one device or collocated on a particular node of a distributed network. As will be appreciated from the following description, and for reasons of computational efficiency, the components of the forum monitoring device 100 can be arranged at any location, such as a general purpose computer, within a distributed network without affecting the operation of the system.

Furthermore, the links 5 can be a wired or a wireless link or any other known or later developed element(s) that is capable of supplying electronic data to and from the connected elements.

In operation, an information stream is received via the distributed network 200 and the links 5. The information stream can include, for example, electronic messages, e-mail messages, postings to a discussion forum, such as bulletin board service, or the like. In general, an information stream can be comprised of any type of electronic documents. The information stream is received via the I/O interface 110, and with the cooperation of the memory 120 and controller 130 monitored by the information monitoring device 140.

The information monitoring device 140 monitors the information stream and compares information about a portion of the information stream to a set of rules, such as a threshold. For example, the information about the portion of the information stream can include how long the current discussion forum has been in use, how many messages have been exchanged on the forum, whether there has been a suggestion to create a new discussion forum, whether a certain number of messages on a particular topic been received within a predetermined time period, whether the rate of messages

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exchanged on a particular topic been statistically greater than normal, whether a certain number of forum members exchanged messages on a particular topic within a predetermined time period, or the like. In general, the rules which trigger the information monitoring device 140 to perform an additional task can be established  
5 based on the particular environment and/or forum the forum monitoring device 100 is monitoring. Therefore, for example, the forum monitoring device 100 can have a plurality of sets of rules, wherein different sets of rules apply to specific monitored fora. Alternatively, the information monitoring device 140 can also apply the same set of rules to one or more monitored information streams or fora.

10 Thus, the forum monitoring device 100 is subscribed to or otherwise associated with one or more fora. For example, the forum monitoring device can be assigned an e-mail address. Then, using this e-mail address, the forum monitoring device 100 is added as a subscriber to one or more fora. As electronic documents are added to the subscribed forum, these documents are delivered to the forum monitoring  
15 device 100 via the e-mail address. As an information stream from the one or more subscribed fora is received by the forum monitoring device 100, the information monitoring device 140 monitors the information stream in order to determine opportunities for creating a new discussion forum. Upon satisfaction of one or more rules, such as satisfying a threshold, a new forum is suggested.

20 In particular, the thresholds may be established such that, for example, the current discussion forum has been in use for x days and/or y messages have been exchanged within the forum. Alternatively, the rules can be established to suggest a new forum when there has not been a suggestion to create a new discussion forum for the current topic and there have been a threshold number of messages posted on the  
25 topic within a predetermined time. Alternatively, the suggestion to create a new forum can be triggered if there has been a suggestion to create a new discussion forum for the current topic and there has been a predetermined number of messages posted on the topic within a predetermined time period or any predetermined number of messages since the last suggestion was made. In general, the rules governing  
30 triggering of a suggestion to create a new forum can be configured based on the particular environment, information streams and/or fora being monitored.

Upon the satisfaction of one or more rules, the invitation determining device 180, with the cooperation of the subscriber determining device 170, determines a name for the new forum, for example, based on the subject lines of the message as

exchanged on the trigger of topic, or based on any other characteristics of the trigger topic. The invitation determining device 180 then sends a suggestion message to all subscribers who posted messages about that topic asking if the subscribers would like to create a new discussion forum for that topic. In particular, the subscriber

5 determining device 170 determines from the information stream all users who participated or posted messages about the particular trigger topic within the forum.

The invitation determining device 180 forwards to the identified subscribers a notification message suggesting creation of a new discussion forum for the identified topic. The invitation determining device 180 monitors responses from the identified  
10 subscribers to determine if one or more new forum(s) should be created. For example, the responses could indicate that two additional fora are appropriate. In this exemplary scenario, two new fora would be created.

Upon receiving an indication from any of the identified subscribers to whom a notification message was sent that a new forum should be created, a new forum is  
15 created with the aid of the forum spawning device 160. However, it should be appreciated that while in this particular exemplary embodiment only one reply to the notification message is required to trigger creation of a new forum, additional rules can be established which may, for example, require that a predetermined number of subscribers request creation of a new forum before a new forum is created.

20 Upon receiving the request for a new forum, the forum spawning device 160 creates a new forum. This new forum can be named based on the name determined by the invitation determining device 180 or be amended, for example, based on one or more subscribers' desires. Once the forum has been created and named, the subscriber maintenance device 190 automatically adds the subscribers identified by  
25 the subscriber determining device 170 to the new forum. Additionally, the subscriber maintenance device 190 can optionally also notify all or a portion of the parent discussion forum, plus any other recipients of messages posted on the trigger topic, that a new forum has been created and that the other members are welcome to subscribe.

30 The electronic document storage device 150 allows forum members to remain current with transactions within a forum. Specifically, the discussions within a forum can be automatically archived so that members and/or non-members may periodically review the new discussion. For example, if a user decides to join a forum, the user can automatically retrieve, with the cooperation of the electronic document storage

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device 150, and the cooperation of the I/O interface 110, the memory 120 and the controller 130, a digest type message containing all or a portion of the recent messages posted within the forum. Alternatively, periodic reports can be sent, with the aid of the electronic document storage device 150 and the subscriber maintenance  
5 device 190 to another discussion forum to indicate activity within the forum that have been spawned from, for example, the parent discussion forum. These reports can be generated and reported at predetermined time intervals, or, for example, when traffic in a subforum has reached a threshold, or the like.

FIG. 2 is a flowchart outlining one exemplary embodiment of a method for  
10 monitoring an information stream, such as a forum, according to the invention. In particular, control begins at S100 and continues to S110. In S110, an information stream is monitored. Next, in S120, information about a portion of the information stream is compared to a set of rules, such as satisfying one or more thresholds, Boolean comparisons, or the like. This comparison can be a rule-based comparison,  
15 statistical model-based comparison, or the like. Then, in S130, a determination is made as to whether one or more of the rules has been satisfied. If one or more of the rules have been satisfied, control continues to S140. Otherwise, control jumps back to S110.

In S140, a notification message is determined. Next, in S150, the message  
20 recipients are identified based on, for example, participation within the monitored information stream. Then, in S160, the notification message is delivered to the identified message recipients. Control then continues to S170.

In S170, the responses from the identified recipients are monitored. Next, in S180, a decision is made whether the responses from the identified recipients request  
25 a new forum be created. If a new forum request is received, control continues to S190. Otherwise, control jumps to S220.

In S190, a new forum is created whose name is, for example, based on the subject lines of the messages exchanged or some other characteristic of the trigger topic. Next, in S200, the subscribers to the new forum are updated by including those  
30 subscribers identified as contributing to the identified topic. Then, in S210, the parent forum is optionally notified that a new discussion forum has been created for the identified topic. Control then continues to S220 where the control sequence ends.

As illustrated in FIG. 1, the forum monitoring device can be implemented either on a single program general purpose computer, or a separate program general



purpose computer. However, the forum monitoring device can also be implemented on a special purpose computer, a programmed microprocessor or microcontroller and peripheral integrated circuit element, an ASIC or other integrated circuit, a digital signal processor, a hardwired electronic or logic circuit such as a discrete element circuit, a programmable logic device, such as a PLD, PLA, FPGA, PAL, or the like. In general, any device, capable of implementing a finite state machine that is in turn capable of implementing the flowchart illustrated in FIG. 2 can be used to implement the forum monitoring device according to this invention.

Furthermore, the disclosed method may be readily implemented in software using object or object-oriented software development environments that provide portable source code that can be used on a variety of computer or workstation hardware platforms. Alternatively, the disclosed forum monitoring system may be implemented partially or fully in hardware using standard logic circuits or VLSI design. Whether the software or hardware is used to implement the systems in accordance with this invention is depended on the speed and/or efficiency requirements of the system, the particular function, and the particular software or hardware systems or microprocessor or microcomputer systems being utilized. The forum monitoring systems and methods illustrated herein, however, can be readily implemented in hardware and/or software using any known or later-developed systems or structures, devices and/or software by those of ordinary skill in the applicable art from the functional description provided herein and a general basic knowledge of the computer arts.

Moreover, the disclosed methods may be readily implemented as software executed on a programmed general purpose computer, a special purpose computer, a microprocessor, or the like. In these instances, the methods and systems of this invention can be implemented as a program running on a personal computer, such as a Java® or CGI script, as a resource residing on a server or graphics workstation, as a routine embedded in a dedicated forum monitoring system, a web browser, an electronic message enhanced cellular telephone, a PDA, a dedicated forum monitoring device, or the like. The forum monitoring system can also be implemented by physically incorporated the system and method into a software and/or hardware system, such as the hardware and software systems of a graphic workstation or dedicated forum monitoring device.

For example, the systems and methods of this invention have in embodiments been used to work with the internal discussion lists solely within the workplace of the inventors. In particular, the exemplary agent has been assigned an e-mail account. A distributed network interface allows users to ask the exemplary agent to monitor, or to  
5 stop monitoring, the internal discussion lists. In response to such a request, the exemplary agent subscribes, or unsubscribes to the specified lists using a programmatic interface to the internal discussion lists. Once the exemplary agent is a member of the list, the exemplary agent monitors the list traffic. The exemplary agent then judges messages to be on the same topic both by checking for in-reply-to  
10 message identifications and by looking for matching subject lines. If all parameter values are satisfied, the exemplary agent will generate a unique name for a new discussion list, based on the subject lines of the topic messages. The exemplary agent will then send a suggestion message to everyone who posted a message on the current topic. Users can agree to this suggestion by responding to the suggestion message.  
15 Users may also include a line in the message that requests that the forum be created with a different name than the name determined by the exemplary agent. Once the exemplary agent receives a suggestion acceptance message, the exemplary agent creates a new discussion list, or forum. The exemplary agent then automatically subscribes itself to the list. The exemplary agent also sets up a distributed network  
20 accessible message archive using, for example, a bulletin board or digest archiving service. The exemplary agent seeds the archive with the trigger messages that caused the forum to be created. Finally, the exemplary agent automatically subscribes all of the topic contributors to the list, or new forum, and then sends an invitation message to the whole list and to any other recipients of the topic messages. Invitees may join  
25 the list simply by responding to the invitation message. New members can automatically receive any postings that were sent to the new forum before they joined. Members who do not join the list can still be kept informed about list activity through reports. For example, at a predetermined interval, the exemplary agent sends a message to each monitored discussion list with information about activity, for  
30 example, including high frequency keywords, number of messages exchanged, number of users, or the like, on discussion lists spawned by the monitored list. Additionally, whenever there is a high activity during a predetermined time on a spawned discussion list, the parent list can be notified.

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For the current exemplary agent, the parameters, or thresholds to trigger requesting of a new forum were set as follows: seven days was chosen as the number of days a forum must have existed before a new forum can be suggested. One day was chosen as a number of days that must have elapsed since a new forum was suggested for a particular topic. Seven days was used as a window within which messages must have been exchanged in order to be counted. Three was chosen as the number of messages on a topic that must be exchanged for a suggestion to be made if no suggestion has been previously made. And finally, 10 was chosen as the number of messages on a topic that must be exchanged for a suggestion to be made if a suggestion has been made previously.

However, it should be appreciated that the above-identified parameters can be altered depending on the particular environment, forum, number of users, or the like within which the forum monitoring system is implemented.

It is, therefore, apparent that there has been provided, in accordance with the present invention, a system and method for monitoring a forum. While this invention has been described in conjunction with a number of embodiments thereof, it is evident that many alternatives, modifications and variations would be or are apparent to those of ordinary skill in the applicable arts. Accordingly, it is intended to embrace all such alternatives, modifications, equivalents and variations that are within the spirit and scope of this invention.

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